

Diverging Diamond Interchange

Bessemer Street / US 129 Bypass



GRESHAM
SMITH AND
PARTNERS

Location: City of Alcoa
Blount County, Tennessee

Construction Cost: \$2.9 million

Schedule: Begin March, 2010
Complete November, 2010

First Diverging Diamond Interchange in Tennessee

Gresham, Smith and Partners were engaged by the City of Alcoa for the design of the improvements for the US 129 Bypass and Bessemer Street interchange. This project was developed in partnership with the City of Alcoa and the Tennessee Department of Transportation (TDOT). It is the first diverging diamond interchange (DDI) in Tennessee and is only the fifth DDI interchange in the United States under construction.

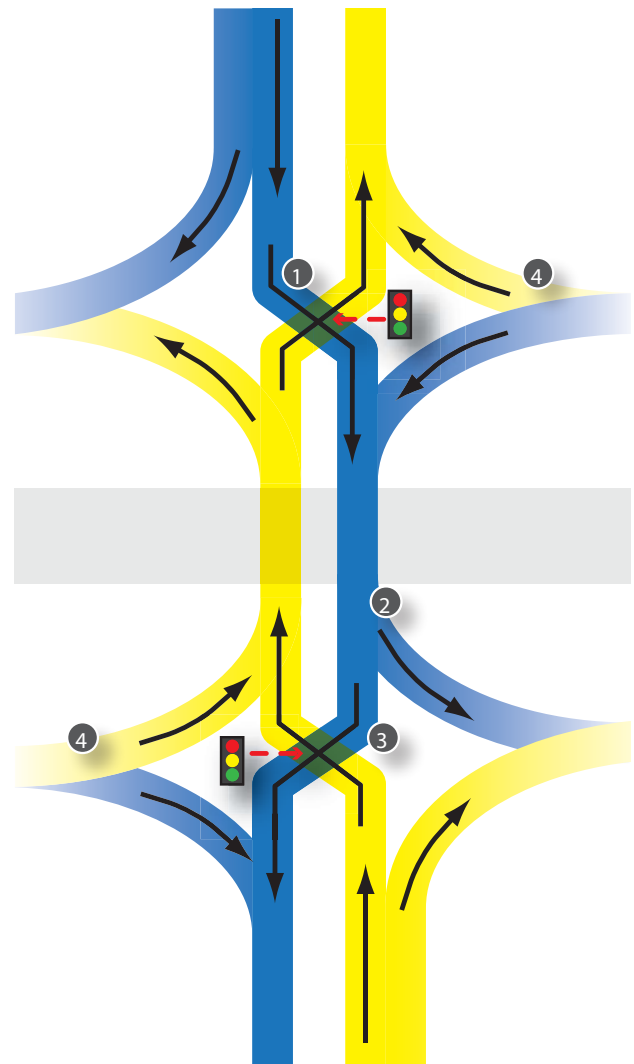
Innovative Design

The design addresses the increasing traffic volumes on the existing heavily congested interchange resulting from the tremendous industrial and commercial growth in the surrounding area. Innovative "diverging diamond" geometry was utilized to maximize the efficiency of the three lanes available under the existing US 129 Bypass

Bridge, while proving to be an affordable option.

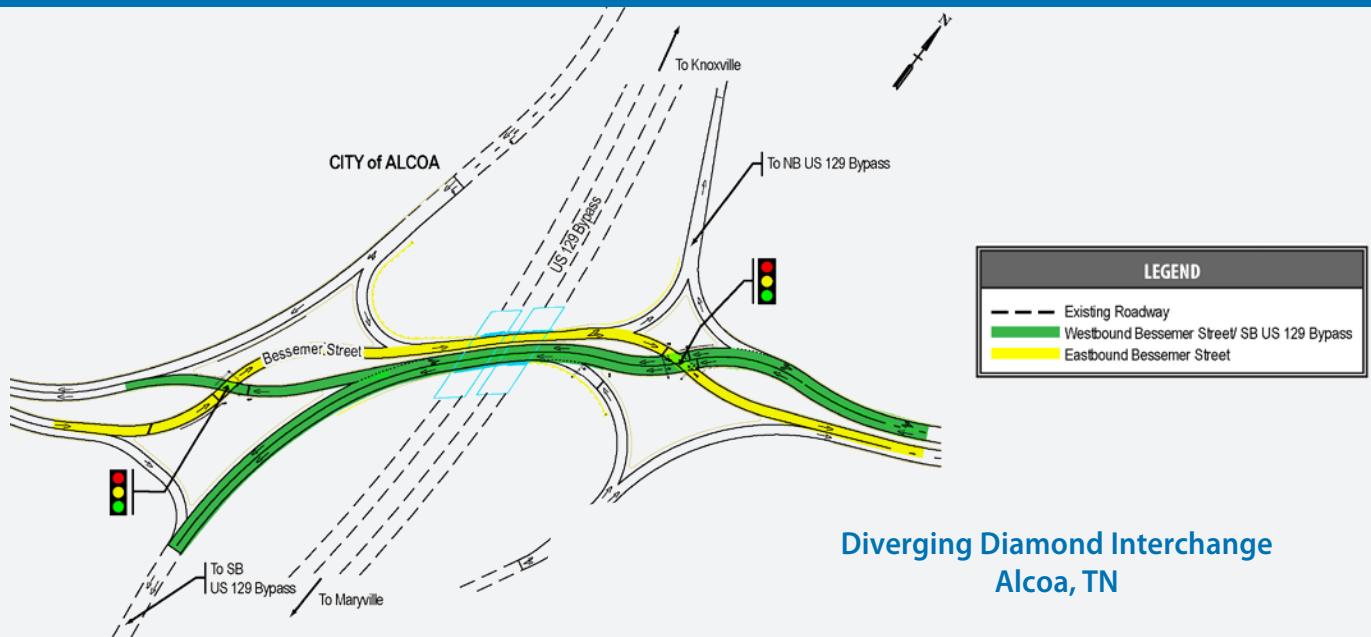
The designed improvements re-align Middlesettlements Road to tie linearly into Bessemer Street. Under the existing US 129 Bypass Bridge, a diverging diamond interchange design requires traffic to crisscross over to the left side of the roadway, separated by concrete barriers, between the proposed traffic signals located at the interchange ramps. This design eliminates several conflicting vehicle movements, particularly the left turns onto the ramps to US 129 Bypass, without the need for costly reconstruction of the existing bridge to provide the additional lanes that would normally be necessary for other interchange designs.

**Eliminates several
conflicting vehicle
movements**



NAVIGATING THE DIVERGING DIAMOND

- ① Motorists approaching the interchange will cross over to the opposite side of the road at the first signal.
- ② Once on the left side, vehicles can free flow onto the freeway without going through another signal.
- ③ Motorists going straight will proceed through the second signal and switch back to the right side of the road.
- ④ Vehicles from the ramps don't have to go through a signal to enter Bessemer Street.



Minimize Impacts / Maximize Benefits

Several other interchange alternatives were studied, however the DDI was chosen as the preferred alternative at this location due to the following benefits:

- **High Level of Service** – Primarily due to the free flowing condition of the heavy left turn movement onto southbound US 129 Bypass which passes through only one signal.
- **Lower Cost** – The DDI did not require construction of a new bridge for construction of additional lanes, significantly minimizing construction costs.
- **Increased Safety** – Eliminating the heavy left turn movement to cross oncoming traffic resulted in fewer conflict points than other alternatives. The geometry of the DDI also makes wrong way entry into the ramps more difficult.
- **Reduced Speeds** – The overall geometry of the DDI provides many traffic calming effects.
- **Shorter Construction Schedule** – Not having to construct a new bridge shortened the proposed construction schedule to less than one year.
- **Signals** – Supplemental near-side traffic signals are placed adjacent to the stop bar in addition to the overhead signals. Upon completion of the DDI interchange, the City of Alcoa and GS&P will continue to monitor and evaluate the signal timing to optimize traffic flow.
- **Glare Reduction** – A median barrier is provided after traffic crosses over to the left side of the roadway between the two ramps intersections. Within the islands at the ramp intersections, berms are provided to minimize headlight glare and provide landscape areas.

Public Education Initiatives

Positive reactions were received from the public during two public meetings during the planning and design phases. During construction, Public education initiatives will continue with outreach activities such as a project web-site, driver perspective meetings, brochures, and news/media advisories.

Construction

- The project was let for construction at the beginning of February 2010 and is expected to be constructed and operable before the end the year.
- There will be periodic closures of Bessemer Street under the US 129 Bypass Bridge to allow for the most efficient construction schedule. To minimize traffic disruptions, the contractor will provide advance notice of these closures to the public throughout the project construction.

DDI Design Highlights

- **Lane Widths** – Lane widths were increased and shoulders utilized to allow emergency vehicles room to pass.
- **Curbing** – The use of curbing for the DDI helps to clearly define the driver's path. Also, curb radii are designed to accommodate truck turning movements.

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